

# **Frames Evaluation of Coal, Nuclear, Electric and Alternative Fuels (CNEAF) Surveys with the Manufacturing Sector of the 2002 Economic Census April, 2005**

Vicki Haitot and Richard Hough  
U.S. Census Bureau  
and  
Shawna Waugh  
Energy Information Administration

## **Purpose of Frames Evaluation:**

The Energy Information Administration (EIA) contracted with the U.S. Census Bureau to conduct five frame evaluations for Coal, Nuclear, Electric and Alternative Fuels (CNEAF) surveys. Each of these survey frames contained manufacturing establishments in the 2002 Economic Census (EC). The agreement was in support of EIA's Strategic Plan 2004-2008. This analysis was intended to evaluate whether or not EIA has sufficient coverage of coal consumption, coke and breeze production, fuel consumption and/or electricity generation in the Manufacturing Sector, NAICS 31-33, production of solar thermal collectors and production of photovoltaic cells and modules.

To date, the Census Bureau has completed three of the five evaluations, as indicated below, for the following surveys:

- EIA-5, "Quarterly Coal Consumption and Quality Report, Coke Plants"  
(See Attachment IV for results)
- EIA-63a, "Annual Solar Thermal Collector Manufacturing Survey"  
(See Attachment II for results)
- EIA-63b, "Annual Photovoltaic Module and Cell Manufacturing Survey"  
(See Attachment III for results)
- EIA-860, "Annual Electric Generator Report" for Combined Heat and Power Plants, (NAICS 31-33) and data for these establishments from the EIA-906, "Annual Electric Generator Report"
- EIA-3, "Quarterly Coal Consumption and Quality Report, Manufacturing Plants"

EIA took the opportunity to share data with the Census Bureau to conduct this statistical analysis because the results of the 2002 Economic Census were available to the Census Bureau at this time. For the EIA-63b, the Census Bureau used its Current Industrial Report, MA334Q<sup>1</sup>, to conduct the analysis in lieu of the 2002 Economic Census because the product detail in the EIA-63b is collected on this Census Bureau survey. The 2002 Economic Census is the universe

---

<sup>1</sup>The MA 334Q is a Current Industrial Report (CIR). It is an annual report that collects data on manufacturers of semi-conductors, printed circuit boards, connectors, capacitors, and other electronic components (except relays), in the United States.

of manufacturing establishments within the U.S., the product detail collected on the Economic Census and the MA334Q defines the frames for this comparison. Coverage was measured using establishment counts, receipts and quantity of shipments from specific products collected on the Economic Census or MA334Q questionnaire. (See attachment I for summary of EIA and Census Bureau frames.)

Title 13, US Code, protects individual establishment data collected during the Economic Census. Therefore, the results of these assessments are subject to the Census Bureau's disclosure policy. The Census Bureau has agreed to analyze and provide as much detail as allowed by law.

### **General Conclusions from Analysis:**

- From the three evaluations, there were seven manufacturing establishments that reported to the Economic Census and were not included in the EIA frames.
- These seven establishments were small relative to the estimates published by the Economic Census. Adding these establishments to the existing EIA frames will have little effect on the estimates published by EIA.
- The EIA frames include wholesalers and importers/exporters. For the purpose of these evaluations, these establishments were excluded from the comparison. From our analysis, the coverage of manufacturing establishments within the three frames is sufficient. However, an analysis of the coverage of these non-manufacturing establishments should be considered by EIA.

### **Matching and Analysis:**

The first step in comparing the frames was to identify the establishments on EIA's frames. The next step was to determine where those establishments were classified in the Census Bureau's Business Register (BR). The BR is the universe of establishments for the Economic Census. Business Register classifications of establishments are based on primary activity performed at the establishment. This implies that an establishment may have some manufacturing capabilities but if the primary activity is not manufacturing then the manufacturing information would be reported as a secondary activity and thus we would have no detailed information as to the manufacturing portion of the establishments' total receipts. Only establishments classified as manufacturing are included in this analysis.

For the 2002 Economic Census, the BR contained approximately 350,000 active manufacturing establishments. For conducting the manufacturing portion of the 2002 Economic Census, the Business Register partitions these establishments into "non-mail" and "mail" groups for processing purposes. Establishments that have fewer than 5 employees are grouped as "non-mail"; the Census Bureau uses administrative information obtained from other Federal Agencies to impute data for these establishments. They accounted for approximately 3% of the total receipts published for the manufacturing sector of the 2002 Economic Census.

In comparing the EIA frames to the Economic Census and the MA334Q, we matched manufacturing establishments on EIA's frames with establishments from the Economic Census and the MA334Q. Within each NAICS industry, the Economic Census and the MA334Q collect and publish products by seven-digit product class and by ten-digit product detail. Each frame consisted of those establishments reporting production of the given product. After we determined which establishments were producing the given product from the Economic Census and the MA334Q, we matched them to EIA's frames. We matched establishments based on name and address. If an establishment on EIA's frame didn't match to the Economic Census or the MA334Q, we conducted Internet research to determine if they were manufacturing that product. Those establishments that were manufacturing but not on the Economic Census were determined to be valid and missing. The same is true for establishments on the Economic Census or the MA334Q but not on EIA's frames.

*Coverage by Counts:* The coverage by number of establishments was measured as the percent of the total number of matched establishments on EIA's frames with the total number of in-scope manufacturing establishments on the frame for the 2002 Economic Census or the MA334Q.

*Coverage by Volume:* The coverage by volume was measured as the percent of the total product value for matched establishments with the total number of in-scope manufacturing establishments on the frame for the Economic Census or the MA334Q.

**Attachment I:**

**Summary of EIA and Census Bureau Frames**

| <b>Survey</b>           | <b>Name and frequency of survey</b>   | <b>Population</b>   | <b>Frame size</b>  |
|-------------------------|---|---|--|
| EC<br>US Census Bureau  | <i>Economic Census</i><br>Conducted every 5 years   | The 2002 Economic Census covers nearly all of the U.S. economy in its basic collection of establishment statistics. Censuses of agriculture and governments are conducted at the same time. | There are approximately 7 million establishments contained in the Census Bureau's Business Register, approximately 350,000 establishments are classified as manufacturing. |
| CIR<br>US Census Bureau | <i>Current Industrial Report (MA334Q)</i><br><i>Annual Survey of Semiconductors and Electric Components Manufacturers</i> | This survey covers the manufacture of semi-conductors, printed circuit boards, connectors, capacitors and other electronic components (except relays), in the US.                           | Approximately 3,000 manufacturing establishments report to the MA334Q. (This includes establishments that produce photovoltaic cells and modules.)                         |
| EIA-63a                 | <i>Annual Solar Thermal Collector Manufacturers Survey</i>  | Census of manufacturers, wholesale, import/export of solar thermal collectors   | 20 reporting units that include single establishments and companies.   |
| EIA-63b                 | <i>Annual Photovoltaic Module and Cell Manufacturers Survey</i>   | Census of manufacturers, wholesale, import/export of photovoltaic modules and cells   | 19 reporting units that include single establishments and companies.   |
| EIA-5                   | <i>Quarterly Coal Consumption and Quality Report, Coke Plants</i>   | Census of active coke plants  | 19 reporting units that include single establishments and companies.   |

## **Attachment II:**

### **Report on Frames Coverage for EIA-63a**

The EIA-63a is an annual survey that publishes data collected from manufacturers of Solar Thermal Collectors within the United States. The frame consisted of 20 establishments in 10 states.

#### **Methodology:**

##### **Matching:**

During the first phase, we determined that 13 of the 20 EIA-63a establishments were classified as manufacturing. The BR had 3 establishments classified in the wholesale sector, 2 establishments classified in construction, 2 did not match to any Business Register establishment. Also 1 establishment in manufacturing went out of business in 2002 and had reported no value to the EIA-63a. These 8 establishments accounted for 10% of the total product value reported to the EIA-63a. They are not included in tables below. After subtracting out the value of the 8 establishments, the EIA-63a total product value was 90% of the total product value reported to the Economic Census for Solar Thermal collectors. The Economic Census had 3 more establishments reported than did the EIA-63a and the value reported by these establishments was 6% of the total product value reported to the Economic Census. For each of the 3 establishments, Solar Thermal Collectors were not the primary product manufactured. The EIA-63a surveyed all 4 establishments that reported Solar Thermal Collectors as the primary product. These 4 establishments accounted for 83% of the total product value reported to the Economic Census.

The manufacturing sector of the Economic Census has production of these Solar Thermal Collectors in NAICS industry 333414, Heating Equipment (Except Warm Air Furnaces) Manufacturing. The Solar Thermal Collectors producers report code 333414A136, Solar Energy Collectors (Water or Air). The establishments that reported code 333414A136 make up the frame for comparison.

When the file for product code 333414A136 was initially created, we found 6 establishments in the EIA-63a frame were non-mailed establishments within the manufacturing sector of the 2002 Economic Census. We researched these establishments and verified that they were manufacturing Solar Thermal Collectors and added the detailed data from the EIA-63a to the product code 333414A136. These additions to product code 333414A136 brought the number of establishments to 14. One establishment was found to have incorrectly reported in product code 333414A136, this establishment was corrected and the total number of establishments in the frame for the 2002 Economic Census for Solar Thermal Collectors producers was 13.

## Coverage:

*Coverage by Counts:* For the EIA-63a, the following equation applies to percent of coverage by count:

$$\frac{\text{Number of Matched Mfg Establishments that produced Solar Thermal Collectors}}{\text{Number of Active Mfg Establishments that produced Solar Thermal Collectors}} = 0.77$$

**Table I: State counts**

| Counts                             | CA   | FL  | ME | MI | NJ  | NV | TX | Total US |
|------------------------------------|------|-----|----|----|-----|----|----|----------|
| On both EC and EIA-63a Frames      | 5    | 2   | 0  | 0  | 3   | 0  | 0  | 10       |
| EC Frame (Product Code 333414A136) | 6    | 2   | 0  | 0  | 3   | 1  | 1  | 13       |
| EIA-63a Frame                      | 6    | 2   | 1  | 1  | 3   | 0  | 0  | 13       |
| On EC and Not on EIA-63a           | 1    | 0   | 0  | 0  | 0   | 1  | 1  | 3        |
| On EIA-63a and Not on EC           | 1    | 0   | 1  | 1  | 0   | 0  | 0  | 3        |
| Coverage by count                  | 0.83 | 100 | -  | -  | 100 | -  | -  | 0.77     |

*Coverage by Volume:* EIA-63a total product value from matched manufacturing establishments was 94% of the total product value reported to the Economic Census.

$$\frac{\text{Unweighted product value of Matched Mfg Establishments that produce solar thermal collectors}}{\text{Unweighted product value of all Mfg Establishments that produce Solar Thermal Collectors}} = 0.94$$

## Reasons and Characteristics for difference between EIA and Economic Census

- There are 7 establishments on EIA's frame not in manufacturing.
- There are 3 establishments on EIA's frame not on the Economic Census.
- There are 3 different establishments that reported Solar Thermal Collectors to the Economic Census not on EIA's frame.
  - These 3 establishments missing from EIA's frame are located in California, Nevada, and Texas.
  - These 3 establishments missing from EIA's frame account for 6% of the total production value reported to Economic Census.

## **Attachment III:**

### **Report on Frames Coverage of EIA 63b**

The EIA-63b is an annual survey that publishes data collected from manufacturers, wholesalers, and importers/exporters of Photovoltaic Modules and Solar Cells. The frame consisted of 19 establishments in 13 states. This frame was matched to the MA 334Q.

For establishments that are classified as manufacturing, the MA 334Q publishes data on value of shipment at the 7 and 10 digit product detail regardless of the industry classifications of the establishments that manufactures the given product.

### **Methodology**

#### **Matching:**

During the first phase of the matching, we determined that 7 of the 19 establishments were not classified in manufacturing. The BR had 4 establishments classified as service, 2 establishments classified in the wholesale sector, 1 establishments classified as retail. These 7 establishments accounted for 29% of the total product value reported to the EIA-63b. They are not included in tables below. One establishment classified in manufacturing did not report production of photovoltaic modules or solar cells on the MA 334Q. The remaining 11 establishments are reporting manufacturing activity in 10 states.

The MA 334Q has production of these photovoltaic modules and solar cells in NAICS industry 334413, Semiconductor and Related Device Manufacturing. The MA 334Q publishes products by seven-digit product class and by ten-digit product detail. The photovoltaic modules producers report code 334413A110, Light sensitive and light-emitting devices, photovoltaic modules. The solar cell producers report code 334413A105, Light sensitive and light-emitting devices, solar cells. The establishments reporting in 334413A110 or 334413A105 or both make up the frame for comparison. The file contained 9 establishments all reporting photovoltaic modules, 8 establishments reporting producing solar cells. Five of the 8 establishments reporting solar cells were also reporting photovoltaic modules. We compared 11 in manufacturing on EIA with 12 on MA334Q in the manufacturing sector.

## Coverage:

*Coverage by Counts:* For the EIA-63b, the following equation applies to percent of coverage by count:

$$\frac{\text{Number of Matched Mfg Establishments that produced Photovoltaic Modules}}{\text{Number of Active Mfg Establishments that produced Photovoltaic Modules}} = 1.00$$

$$\frac{\text{Number of Matched Mfg Establishments that produced Solar Cells}}{\text{Number of Active Mfg Establishments that produced Solar Cells}} = 0.88$$

Five of 12 establishments manufacture both photovoltaic modules and solar cells. Four establishments only manufacture photovoltaic modules, and three establishments only solar cells.

**Table I: State counts**

| Counts   | CA   | DE  | IA  | MA  | MD  | ME  | MI  | NM  | OH  | PA  | U.S. Total |
|--|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------|
| On both MA334Q and EIA-63b Frames                    | 2    | 1   | 1   | 2   | 1   | 0   | 1   | 1   | 1   | 1   | 11         |
| MA334Q Frame (Product Code 334413A110 or 334413A105) | 3    | 1   | 1   | 2   | 1   | 0   | 1   | 1   | 1   | 1   | 12         |
| EIA-63b Frame  | 2    | 1   | 1   | 2   | 1   | 1   | 1   | 1   | 1   | 1   | 12         |
| On MA334Q and Not on EIA-63b                         | 1    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 1          |
| On EIA-63b and Not on MA334Q                         | 0    | 0   | 0   | 0   | 0   | 1   | 0   | 0   | 0   | 0   | 1          |
| Coverage by count                                    | 0.66 | 100 | 100 | 100 | 100 | --- | 100 | 100 | 100 | 100 | 0.92       |

*Coverage by Volume:* The coverage is 100% for photovoltaic modules and unavailable for solar cells due to disclosure limitations.

$$\frac{\text{Unweighted product value of Matched Mfg Establishments that produce Photovoltaic Modules}}{\text{Unweighted product value of all Mfg Establishments that produce Photovoltaic Modules}} = 1.00$$

## Reasons and Characteristics for difference between EIA and Economic Census

- One establishment in the manufacturing sector that reported production on EIA's frame did not report photovoltaic production on the MA 334Q.
- Establishments manufacturing integrated circuits, opt-electronics, non-photovoltaic semiconductors were not part of the EIA's frame and not included in counts.
- EIA is missing one establishment reporting solar cells production in California.



## Attachment IV:

### Report on Frames Coverage of EIA 5

The EIA-5 is an annual survey that publishes data collected from coke plants within the United States. There are 19 establishments in 10 states on EIA-5 frame<sup>2</sup>.

#### Methodology

##### Matching:

During the first phase of the matching, we determined that all 19 establishments were classified in manufacturing. The establishments that reported in the following ten digit product codes<sup>3</sup> made up the frame used to compare establishments on the EIA-5 frame.

|            |   |
|------------|---|
| 3241991111 | Coke oven products, coke (excluding screenings and breeze) made in coke oven establishments |
| 3241991121 | Coke oven products, screenings and breeze, made in coke oven establishments                 |
| 3311111101 | Coke oven products, coke (excluding screenings and breeze) made in steel mills              |
| 3311111103 | Coke oven products, screenings and breeze, made in steel mills                              |

##### Coverage:

*Coverage by Counts:* For the EIA-5, the following equation applies to percent of coverage by count:

$$\frac{\text{Number of Matched Mfg Establishments that produced Coke and Breeze}}{\text{Number of Active Mfg Establishments that produced Coke and Breeze}} = 0.83$$

There are 4 establishments on the EC frame missing from EIA's frame and; there is one establishment on EIA's frame missing from EC frame. Addresses were used based on EIA's frame.

---

<sup>2</sup> One establishment is jointly owned by two respondents on EIA's Frame counting as one in tables.

<sup>3</sup> These codes are reported in two different 6-digit NAICS industries. Coal Coke Oven establishments are classified in All Other Petroleum and Coal Products Manufacturing 324199, and Steel Mills are classified in Iron and Steel Mills 331111.

**Table I: States counts**

| Counts  | AL  | IL  | IN   | KY  | MI   | NY  | OH  | PA  | VA  | WV  | U.S. Total |
|---|-----|-----|------|-----|------|-----|-----|-----|-----|-----|------------|
| On both EC and EIA-5 Frames   | 3   | 1   | 4    | 1   | 1    | 1   | 2   | 4   | 1   | 1   | 19         |
| EC Frame (Product Codes 3241991111, 3311111101, 3241991121, and 3311111103) | 3   | 1   | 5    | 1   | 3    | 1   | 2   | 5   | 1   | 1   | 23         |
| EIA-5 Frame   | 3   | 1   | 5    | 1   | 1    | 1   | 2   | 4   | 1   | 1   | 20         |
| On EC and Not on EIA-5  | 0   | 0   | 1    | 0   | 2    | 0   | 0   | 1   | 0   | 0   | 4          |
| On EIA-5 and Not on EC  | 0   | 0   | 1    | 0   | 0    | 0   | 0   | 0   | 0   | 0   | 1          |
| Coverage by count   | 100 | 100 | 0.80 | 100 | 0.33 | 100 | 100 | 0.8 | 100 | 100 | 0.83       |

*Coverage by Volume:* Manufacturing establishments on the EIA-5 accounted for 98% of the total shipments reported to the Economic Census.

NOTE: There is a 6% imputation rate on the total volumes for coke and breeze from the Economic Census non-response.

$\frac{\text{Unweighted Quantity of Shipments of Coke and Breeze Matched Mfg Establishments on EC}}{\text{Unweighted Quantity of Shipments of Coke and Breeze All active Mfg Establishments on EC}} = 0.98$

**Table II: Total Volumes** (Quantity of Shipments for Coke and Breeze in Short Tons)

| Volume (Short Tons) | U.S. Total |
|---------------------|------------|
| Matched Cases on EC | 13,238,329 |
| All Cases on EC     | 13,503,791 |
| Coverage by Volume  | 0.98       |

### Reasons and Characteristics for difference between EIA and Economic Census

- Steel companies are contracting out coke production.
- Changes in ownership, including joint ownerships of a single coke plant.
- EIA is missing one establishment in Pennsylvania, one in Indiana, and two in Michigan.